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ABSTRACT

The purpose of this research was to: (1) ascertain the existence and functions of practical thinking styles, illuminating teachers' thought processes; (2) identify practical thinking styles of experts (N=5) and compare them with those of novices (N=5); and (3) present several implications for rethinking teacher education in Japan. Qualitative and quantitative methods were used to analyze subjects' reactions to a videotaped lesson given by an expert teacher. Results suggested several characteristics of excellent practical thinking styles demonstrated by expert teachers: (1) thinking in action; (2) multiple points of view and a wide perspective; (3) active, sensitve, and deliberative involvement in a situation; (4) content-relevant, cognition-relevant, and context-relevant thinking; and (5) problem-framing strategy in a context. To make teachers more intellectual, more autonomous, and more creative, great importance should be attached to case methods rather than lecture methods in preservice and inservice teacher education. (IAH)

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# Practical Thinking Styles of Teachers

ED339683

## A Comparative Study of Expert and Novice Thought Processes and Its Implications for Rethinking Teacher Education in Japan

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Agenda;

1) Introduction: Teacher's Practical Thinking
2) Research Methodology: Purpose, Concepts and Procedures
3) Characteristics of Experts' Practical Thinking Styles
4) Conclusion: Implications for Rethinking Teacher Education

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(1) Introduction : Teacher's Practical Thinking

Our aspiration to build a solid professional culture in Japanese schools will only be an unfulfilled dream without reforming the bureaucratic educational system and without opening an avenue through which teachers can empower their professional wisdom.

In Japan, teachers have not been treated so much as professionals. Rather, they have been regarded as national servants in prewar days and as public servants or as technicians after the war, and have been obliged to devote themselves to perform predetermined tasks. In particular, since the national curriculum was enacted in 1958, teachers have been mostly deprived of their autonomy and freedom in their profession.

However, the concept of teaching as a profession was raised in the progressive movements in 1920's and in the postwar age ( 1945-1955 ), and its heritage has been handed down. Innovative teachers have aspired to professional autonomy and freedom. Though their vital efforts have been restricted under the bureaucratic system, their concept of teaching as a profession has been embodied in informal ways of teacher inservice education.

For example, almost all the elementary schools hold in-house case study workshops based upon classroom observation 3-10 times per year. ( In junior or senior high schools, usually 1-3 times per year ). Innumerable teachers record their practices to reflect on them. Many teachers write case books or reports in teacher journals. In addition, numerous voluntary study groups, which mainly utilize case methods, are organized. According to my survey of 3,987 teachers in 1981, over half of them (53%) had been active in some voluntary study groups, excluding the study groups organized by the teachers' union and by school boards, and one fifth (21%) of the teachers were active in them at that time. ( Among them, one fifth were members of national groups,

one third were members of prefectural groups, one third, city-wide groups and others, local, small groups. ) These informal groups of teacher inservice have played very important roles in guaranteeing the high quality of teaching and in opening a pathway to teachers' autonomous professional culture against the bureaucratic school system and its traditional culture.

Nevertheless, there are many constraints which restrict the professionalism of teachers, that is to say, too detailed prescriptions of the national curriculum, too much content to be taught, too much uniformity in textbooks checked by Ministry of Education, too many students in a classroom ( as many as 40 children ), too much standardization of time allotment ( 45 minutes per lesson ), too many trivial jobs added to teaching responsibilities and too much stress and pressure applied by parents and students under the entrance examination system. And what is more, teachers gradually have been isolated from each other as a result of the policies of scapegoating teachers and of their ideological conflicts in facing recent school crises.

If we wish to build a solid professional culture of teachers not in a dream but in reality, we should search for a highway to teaching as a profession, inheriting the legacy of professional growth from informal teacher inservice groups. In other words, teachers can open the highway to teaching as a profession by enriching their practical knowledge and their practical thinking styles embedded in the informal culture of teachers.

At the Honolulu Meeting of Japan/US Teacher Education Consortium last year, I presented a paper concerning teachers' practical knowledge, entitled, "Research on Teaching and Inservice Education : An Experiment to Empower Wisdom of Teachers ". In the paper, I described the following assumptions and principles of teachers' practical knowledge.

1) Teachers' practical knowledge, which is generated in actual teaching, is not simple and plain but very rich and complex. The knowledge is not so rigid and universal as we re-

searchers possess, because it is a kind of empirical knowledge stemming from personal practice. Practical knowledge is more functional, vital and flexible than the theoretical knowledge which many researchers use. It may be defined as a deliberative knowledge, which teachers use in their professional field.

2) Teachers' practical knowledge is accumulative and communicable in the form of case knowledge, so to speak, child specific, content specific and context specific knowledge. Thus, we assume that the case method ( clinical research on teaching ) is an effective way to develop each teacher's knowledge.

3) Teachers' practical knowledge can not be derived from a specific academic field. It is a holistic knowledge which is relevant to the multiple academic fields. In addition, it is an integrated knowledge, with which teachers probe and solve a problem, or make a better decision, discerning multiple possibilities of teaching in an ill-structured situation.

4) Teachers' practical knowledge is not only overt but also covert. We assume that the implicit (tacit) knowledge of teachers is as important as their explicit knowledge in their teaching. Accordingly, we attach great importance to diagnosing and criticizing each teacher's knowledge from multiple viewpoints, illuminating and deliberating the depth, complexity and richness of her (his) practice.

5) Each teacher's knowledge is based upon her (his) personal experience. In order to strengthen teacher knowledge more solidly, we must provide many opportunities for teachers not only to promote mutual exchange of their knowledge but also to share practical experience with each other.

Today, we wish to present another key issue, teachers' practical thinking styles, in pursuit of clarifying their practical epistemology. Our research is now in progress. Therefore, we are going to show you some results of our recent empirical research on teachers' thinking styles, along with its implications for rethinking the methods of teacher education in Japan.

(2) Research Methodology: Purpose, Concepts and Procedures

It may be well known that expert teachers form and use elaborate practical thinking styles in their teaching. However, teachers' thinking processes are so complicated and so ambiguous that, if we attempt to illuminate them, we need to define key concepts and to devise some effective procedures.

We assumed that teachers' practical thinking might be recognized through studying their monitoring thought process. In particular, what kind of facts about teaching do teachers notice in a lesson, how do they appreciate or interpret the facts, how do they frame a problem based upon them, how do they probe the cues to solve a problem and how do they design an alternative lesson plan. Studying these issues may make it possible to capture teachers' thinking styles more clearly.

Then, we invented an approach to illuminate teachers' thoughts by focusing on their on-line and off-line monitoring of a videotape record of one lesson. The purpose, concepts, and procedures of our research are the following :

<purpose>

1) To ascertain the existence and functions of practical thinking styles, illuminating teachers' thought processes.

2) To identify practical thinking styles of experts and compare them with those of novices.

3) To present several implications for rethinking teacher education in Japan.

<concepts>

1) Teachers' practical thinking styles : The concept of teachers' practical thinking styles is comprehensive. It means a personal consistent ( and, usually, implicit ) style with which each teacher thinks in or on action, for example, how she ( or he ) detects meaningful facts in a lesson, how she sets and solves a problem in a lesson and how she reflects upon it. We consider this practical thinking as contextualized thinking of

problem solving, which we can regard as a core element of teachers' professional wisdom.

2) Expert teachers : The concept of "expert" teacher is not well defined only by length of teaching career or by width of teaching skills. Teaching expertise should be regarded as a more complicated and a more multifarious issue. If we respect teachers as thoughtful practitioners, we must define "expert" teachers in terms of their professional wisdom developed through long-term creative experiences. So, starting our research, we selected five expert teachers who have over twenty years experience as teachers and who are the leading teachers of their elementary schools or of some voluntary study groups, while five novice teachers were chosen at random among the first year teachers of elementary schools.

<procedures>

1) We sent a videotape of a lesson and a request manual to five experts and five novices in April - May, 1990. The videotape was a record of a poetry lesson which was taught by a fifth grade teacher with fifteen years classroom experience.

2) The teachers performed the following two tasks according to our request manual in May - June :

(A) Thinking-Aloud Task ( On-line monitoring ) : The teachers watched the video and commented on what they saw, felt and thought without stopping their observation of the lesson. The comments were recorded on cassette tapes. We think these comments ( protocol records of on-line monitoring ) reflect their usual practical thinking in their own teaching.

(B) Writing Report Task ( Off-line monitoring ) : The teachers wrote a short summary of their thoughts just after observing the lesson. These short reports indicate their styles of framing a problem of the lesson.

3) After receiving the teachers' cassette tapes ( protocol records ) and their short reports, we studied teachers' thinking

styles with both an ideographic ( qualitative ) approach and a comparative ( quantitative ) approach. Then, for comparing the experts' thinking styles with the novices, we utilized idea unit analysis by setting up the following categories.

What Teachers talk ( write ) : teacher's or kid's verbal activity, non-verbal field <body language, classroom climate and environment>, pedagogical skill, pedagogical content and cognition, and teaching context.

How teachers talk ( write ) : perspective < wide or narrow >, point of view < simple or multiple >, relevance < content relevant, cognition relevant, context relevant or irrelevant >, involvement < active or inactive : talk about facts, impression, or reasoning and interpretation >, framing < applying a frame to context or framing a problem in a context >.

Thus, we characterize expert practical thinking styles as thinking in action, active, sensitive and deliberative involvement in a situation, and using multiple points of view and a wide perspective. Expert practical thinking is also content relevant, cognition relevant and context relevant thought utilizing a problem framing approach to construct and reconstruct their thoughts on teaching. We assumed that expert teachers would exhibit more sophisticated, more deliberative and more excellent practical thinking styles than novice teachers.

(3) Characteristics of Experts' Practical Thinking Styles

We are going to show you some results of our research. Five major results were abstracted from our research.

1) Expert teachers excel mainly in impromptu thinking, that is to say, thinking during teaching rather than thinking after teaching.

A remarkable difference between expert teachers and novice teachers appeared in the thinking-aloud task ( in observing the lesson, on-line monitoring system ) rather than in writing report task ( after observing the lesson, off-line monitoring system ). It was revealed that much more impromptu thought was exhibited by experts than by novices.

Please look at Figure 1 and Figure 2. The number of idea units ( mainly, sentences ) in the five experts' thinking-aloud task were about twice as many as that of the five novices. Comparing the number of the experts' words in the thinking-aloud task with that of the novices, the experts' words were nearly seven times as many as the novices. What is more, the experts covered a wide range of content plentifully described, while the novices covered a narrow range of content poorly repeated. The difference is crucial. Expert could monitor a lesson by impromptu thinking, while novices could not. The novices mainly reflected after teaching.

Based upon these results, we can conclude that the professional wisdom of expert teachers appeared mainly as impromptu thinking in teaching.

2) Expert teachers use multiple view points and interactive perspectives to think during teaching.

We divided the experts' and the novices' protocol idea units into two categories, <talk about teaching> and <talk about learning>. The result is interesting. Please look at Table 1. All five experts talked about teaching as much as they did about learning. The mean proportion of talk about teaching per total idea units was about 50% and SD (standard deviation) was very small (4.1). But the novice teachers were different. Some novices talked mostly about teaching, and other novices talked mostly about learning. Therefore, SD of the novices was large (22.7).

These results mean that the experts monitored teaching from at least two points of view, while the novices used only

one point of view, either teacher's or student's. In addition, findings suggest that the experts could consider both teaching relevant to learning and learning relevant to teaching, while the novices thought either teaching irrelevant to learning or learning irrelevant to teaching. We concluded that the experts are better at grasping the complex structure of teaching and, of course, make better teaching decision deliberated from their multiple points of view.

3) Expert teachers are actively, sensitively, and deliberatively involved in a situation, to probe the cues of problem setting or problem solving and to detect possible ways of improved teaching.

In order to study expert and novice involvement in student's learning, we classified the idea units regarding student learning into three categories, (a) talk about <fact> (b) talk about <impression> and (c) talk about <reasoning (or interpretation)>. Talk about <fact> involves repetition of child's talk or mere description of child's behavior. Talk about <impression> contains simple comments like this." His talk is wonderful " or " A puzzled expression crosses his face". Talk about <reasoning> means more active thinking, that is to say, reasoning of speaker's intention and interpretation of talk, for example, " I guess he wishes to give another opinion," or " Her talk is excellent because she captures the essence of this phrase."

Please look at Figure 3. It was astonishing to us that the proportion of <reasoning> idea units per total idea units of the experts was very different from that of the novices. The experts' percentage of <reasoning> idea units was 45.3%, while the novices' was only 5.7%. In contrast, the experts' percentage of <fact> idea units was 9.5%, while the novices' was 32.4%. This means that expert teachers can be involved in student learning, actively and thoughtfully, and that novice teachers

are passively involved only in apparent behaviors of children which everyone easily finds.

Next, in order to study how the experts and the novices monitored the teacher's activity, we classified the idea units regarding teaching activities into four categories, (a) talk about <fact > , (b) talk about <interpretation> of the intention or meaning of the teacher's act, (c) talk about <prediction> and (d) talk about <better teaching>. Examples of each category are as follows :

<Fact> ; " The teacher chimes with student's talk.", "The teacher is asking the students for their first impression of the poem."

<Interpretation> ; "Now, the teacher relates this student's talk with the previous talk," " This teaching activity is excellent because it facilitates children's interests in the poem."

<Prediction>; "This questioning will be very effective later," " I suppose this lesson will progress comfortably."

<Better teaching> ; "This teacher should explain the issue more concretely," " If I were the teacher, I would speak more politely in this situation."

Please look at Figure 4. You can find several notable differences between the experts and the novices in each category. The mean proportions of three categories, <interpretation>, <prediction> and <better teaching> of the experts were far higher than those of the novices. On the contrary, the mean proportion of talk about <fact> of the novices was 92.7%, while that of the experts was 30.3%. Novices mostly talked about obviously visible teacher's behaviors.

The results suggest that the experts monitored teaching as active and thoughtful practitioners, as if they were teaching in the classroom. They utilized multiple perspectives, namely their own perspective, the teacher's perspective and the learner's perspective, to search for a problem of a lesson and to discover possible approaches for better teaching. In short, expert teachers grasp the aspects of a lesson as an active problem-

solver and as a creative decision-maker.

4) Expert teachers think, having a tight relationship to content specific, cognition specific and context specific.

How much of experts' thinking is content specific, cognition specific and context specific ? To study this issue, we set up two areas.

First, in order to study teachers' content relevant and cognition relevant thinking, we divided the idea units into two categories, <content relevant or cognition relevant> and <irrelevant>. The category of <content relevant or cognition relevant> includes the talk relevant to the text content or to the student's cognition, while the category of <irrelevant> involves the talk irrelevant both to content and to cognition.

Next, we divided idea units into <context relevant> and <irrelevant> categories. Here, we used the word, "context", comprehensively. If an idea unit refers to the context of teacher's or student's thinking process, if it refers to social context of the teacher's or kids' activities, or if it refers to the contextual structure of the text, we regard it as <context relevant> talk.

We found noteworthy differences between the experts and the novices both in <content relevant or cognition relevant> thinking and in <context relevant> thinking. Please look at Figure 5. The experts' <content relevant or cognition relevant> talk was 37.3% per their total talk, while that of the novices was only 1.4%. The experts could think in such a way as "I think this girl thinks clearly by interpreting this text content," or "This boy tells an opinion against the girl's previous opinion." They could concretely appreciate and interpret the facts of the teaching.

Please look at Figure 6. Concerning <context relevant> thinking, the mean proportion of the experts' context-relevant idea units was 54.1%, while that of the novices' was only 12.1%.

We can conclude that expert teachers are able to correlate

the various teaching or learning activities with each other in a specific context. In particular, they can focus on the relevance of student talk to specific content and to specific cognition. To be brief, the experts can teach based upon contextualized thinking, while the novices teach regardless of specific content, cognition and context. We think this is the reason why experts can think impromptu in action and creatively improve their teaching. This is also the reason why novices can not be flexible in their teaching and unfortunately tend to be eager for the trivial skills.

5) Expert teachers think about teaching to frame a problem, constructing and reconstructing their thoughts to conform with the teaching process and context.

We compared the experts' problem framing in on-line and off-line monitoring with that of the novices. To study this issue, we identified the key concepts of each teacher from the thinking-aloud protocol and the written report, and then we tried to detect the implicit relationship within the concepts and to describe it as an explicit structure map.

According to our research, the experts monitored and detected meaningful facts based upon their contextualized thinking, and then, they gradually correlated them to each other to construct and reconstruct a core aspect of the teaching. The experts could frame their thoughts to conform with a specific teaching. They were creative thinkers about teaching. On the contrary, the novices rarely found key concepts. Even if they found some concepts, the concepts remained isolated from each other. They could hardly frame a problem in teaching, though they could apply a prescribed framework to teaching. The results hint that novice teachers tend to be captured by some stable doctrines without being empowered by their practical thinking style in some way.

(4) Conclusion: Implications for Rethinking Teacher Education in Japan

It has been asserted that in Japan, teachers should cover broad fields of theoretical knowledge offered by university researchers and a large number of specific skills and general attitudes taught in lecture courses at teacher training centers of the school boards. In this system, the main places for teachers' growth are out side their classrooms. Their growth is regarded as technical expertise, in other words, development of their competence to apply prescribed theories or techniques into their practice. This ` teacher as technician ' model is still dominant in Japanese teacher in-service education.

But, it has also been claimed by many teachers that the theoretical knowledge and techniques taught at universities or at teacher training centers are not useful to improve their own teaching. Many point out that the best way to improve their teaching is reflecting upon their own teaching and that the most effective advisers are their colleagues at school. These teachers' voices hint that the central locus for developing each teacher's professional knowledge and wisdom ought to be her ( his ) own classroom and that the functions of many in-service opportunities should be reorganized to form a structure of concentric circles centering upon each teacher's own teaching.

Many issues come into question. Why should the central locus for teachers' professional growth be in their classrooms ; why can't theoretical knowledge and techniques be useful for novice teachers ; what kinds of knowledge do teachers generate and use in their classrooms ; how do teachers think in action as professionals and finally how do expert teachers develop their professional wisdom and represent it. These issues have not been discussed directly by teacher educators and educational researchers.

Now let me return to our point. As we mentioned above, ex-

pert teachers form and utilize excellent practical thinking styles in their profession. These practical thinking styles are generated in actual teaching and are different from the theoretical thinking that we researchers are familiar with.

From the results of our empirical research, we can abstract from the expert teachers' thought processes several characteristics of excellent practical thinking styles. In outline form, these are (1) thinking in action (impromptu thinking ), (2) multiple points of view and a wide perspective, (3) active, sensitive and deliberative involvement in a situation ( with probing and detecting the cues of a problem ), (4) content relevant, cognition relevant and context relevant thinking, and (5) problem framing strategy in a context. We concluded that these five features should be the core elements of excellent practical thinking styles which assure teachers of teaching expertise.

Based upon our conclusions, if we wish to make teachers more intellectual, more autonomous, and more creative, we should attach great importance to case methods rather than lecture methods in preservice and inservice teacher education. Expert teachers' practical knowledge and their thinking styles are content specific, context specific and cognition specific, as we mentioned above. However, teacher educators and researchers have ignored these three ` C ' specifics, being occupied in pursuit of a myth of attempting to make a universal program which every teacher should cover.

We are sure that it is necessary to provide many rich opportunities of case studies of teaching to cultivate practical knowledge and practical thinking styles. Case methods developed in a deliberate way will enable teachers to combine reflection on their own teaching with many kinds of theoretical knowledge from diverse research fields. In other words, we should reconstruct teacher preservice and inservice curricula not only on the principle of ` theory into practice ' but also on the principle of ` theory through practice ', and we should advance case methods in teacher education as a collaborative research of

teachers, educational researchers, and other professionals.

We believe that our aspiration for building a solid professional culture in Japanese schools ought not be an unfulfilled dream. If we are able to find out a pathway to open teachers' narrow perspectives, if we are able to improve case methods to enrich teachers' knowledge, if we are able to cultivate more sophisticated thinking styles in teachers, and if we are able to prepare more clinical researchers who are capable of growing with teachers hand in hand, we shall be able to discover the highway to establish the concept of ` teacher as professional ' in a genuine sense.

Our research on teachers' practical thinking styles is now in progress. Further research, which will refer to case methods, will be presented at the next meeting of JUSTEC in the United States.

# Practical Thinking Styles of Teachers

## Figures and Tables

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Naoki Iwakawa ( Doctoral Student, The University of Tokyo )

Fig.1 The mean number of idea units

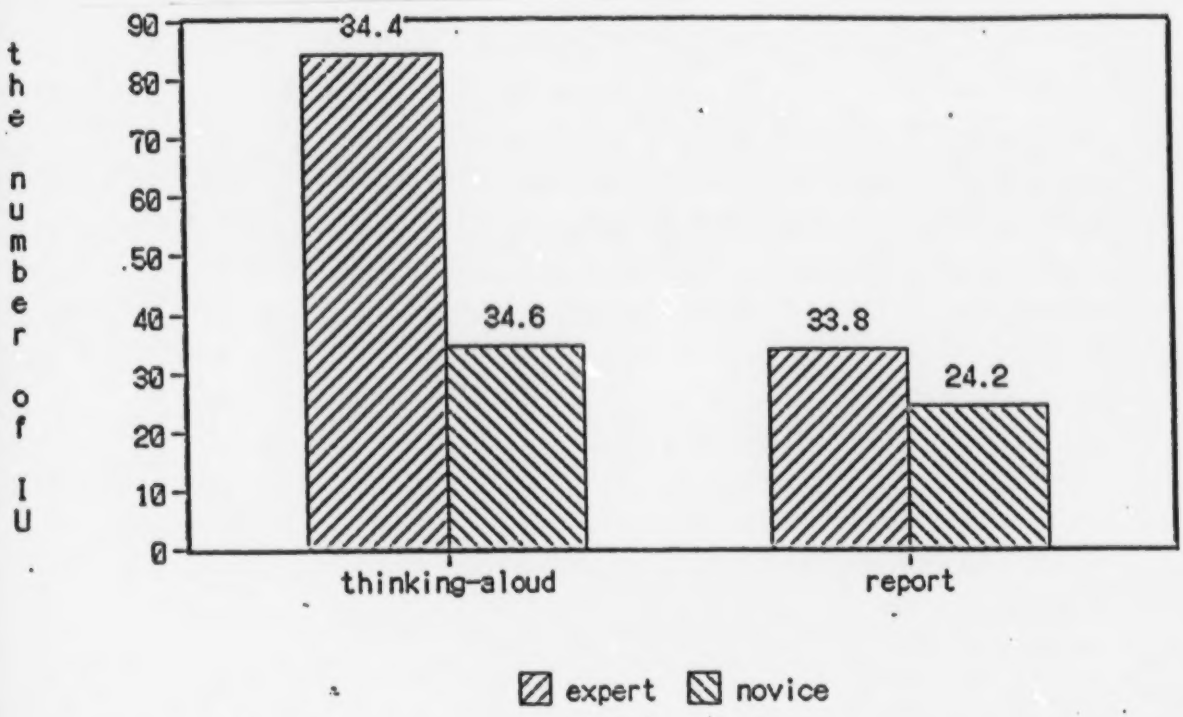


Fig.2 The mean number of words

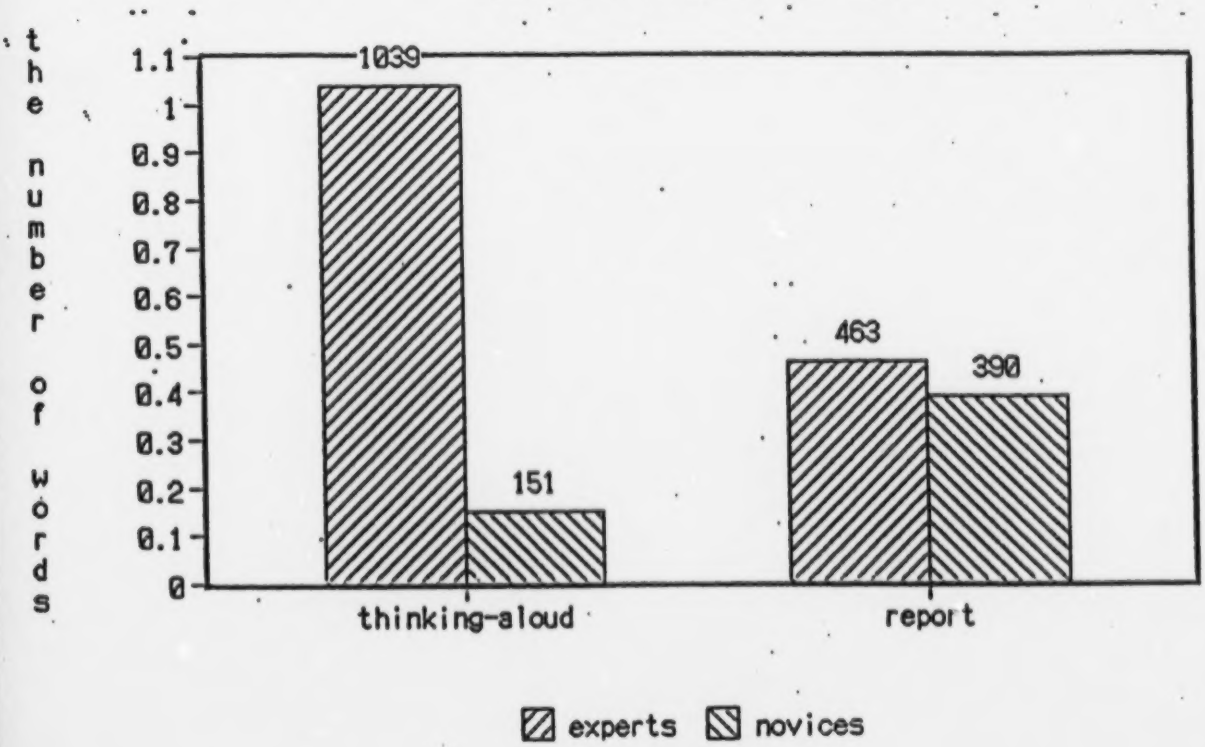

Table 1 Percentage of talks about teaching and those of learning

| | teaching(%) | learning(%) |
|---|---|---|
| Expert1 | 44.4 | 55.6 |
| Expert2 | 45.3 | 54.7 |
| Expert3 | 51.0 | 49.0 |
| Expert4 | 54.8 | 45.2 |
| Expert5 | 52.9 | 47.1 |
| SD | 4.1 | |
| Novice1 | 78.4 | 22.6 |
| Novice2 | 44.0 | 56.0 |
| Novice3 | 12.5 | 87.5 |
| Novice4 | 22.7 | 77.3 |
| Novice5 | 30.8 | 69.2 |
| SD | 22.7 | |

Fig.3-1 Talk about Learning

Experts

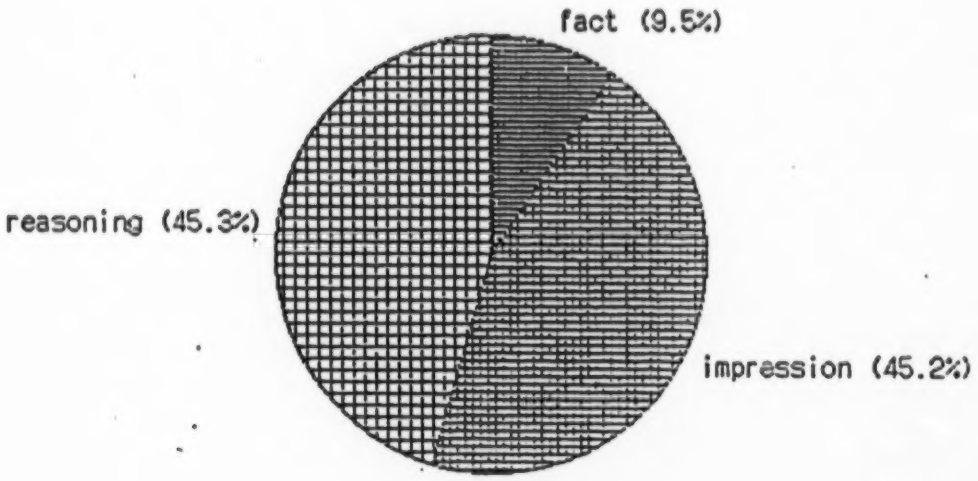


Fig.3-2 Talk about learning

Novices

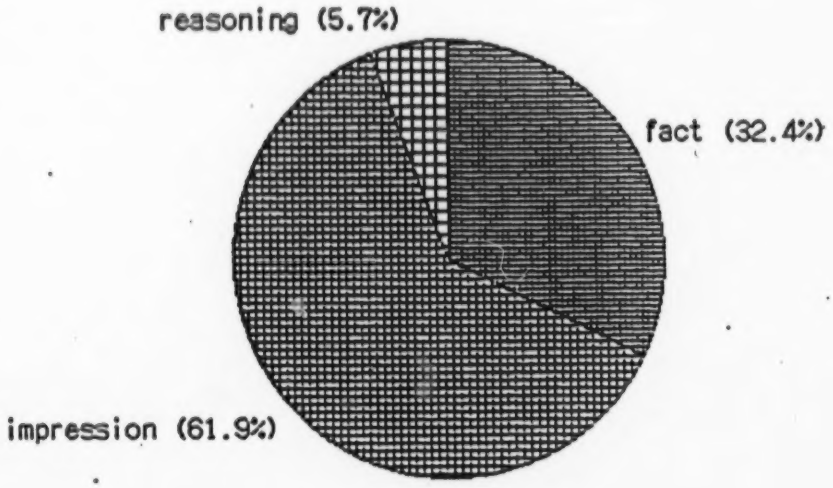

Fig.4-1 Talk about Teaching

Experts

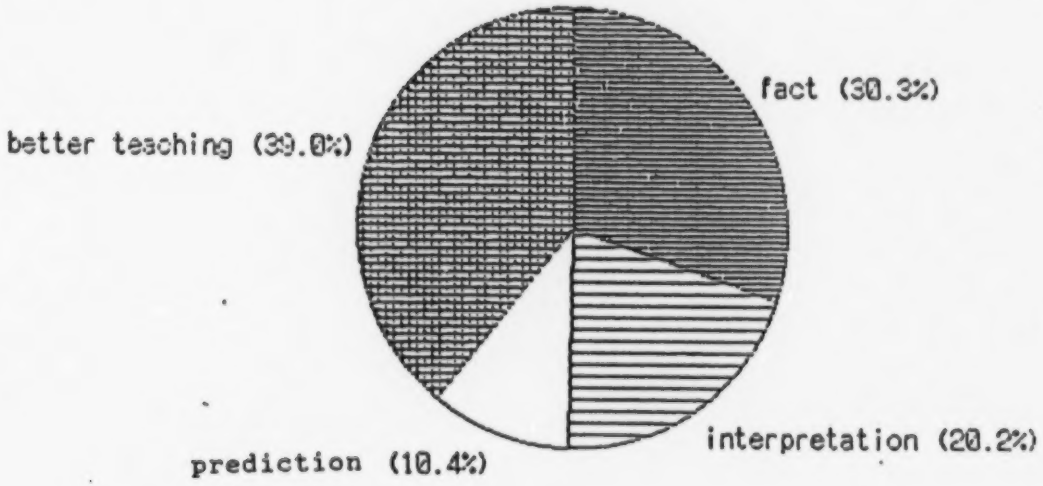


Fig.4-2 Talk about Teaching

Novices

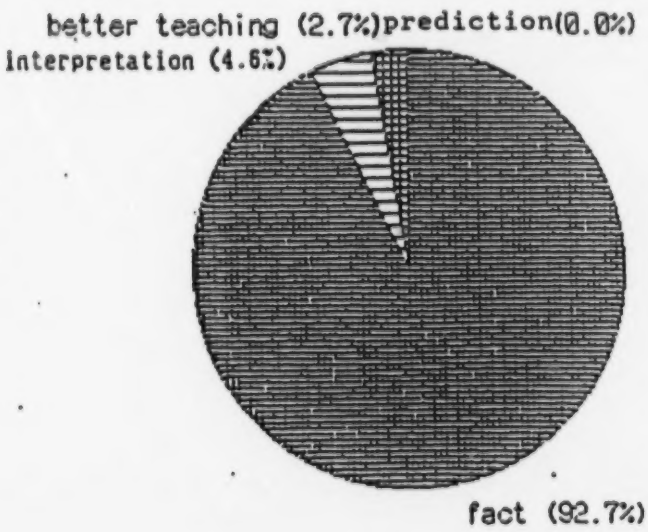

Fig.5-1 Relevance to content(cognition)
Experts

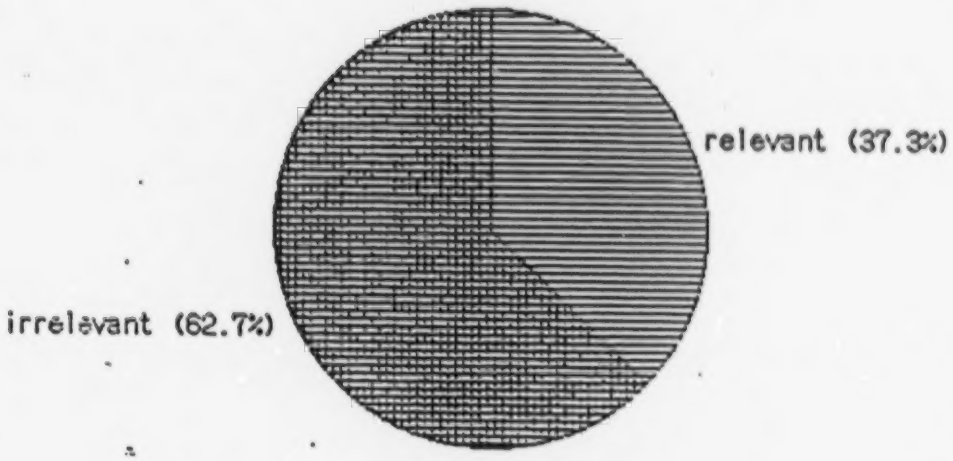


Fig.5-2 Relevance to content(cognition)
Novices

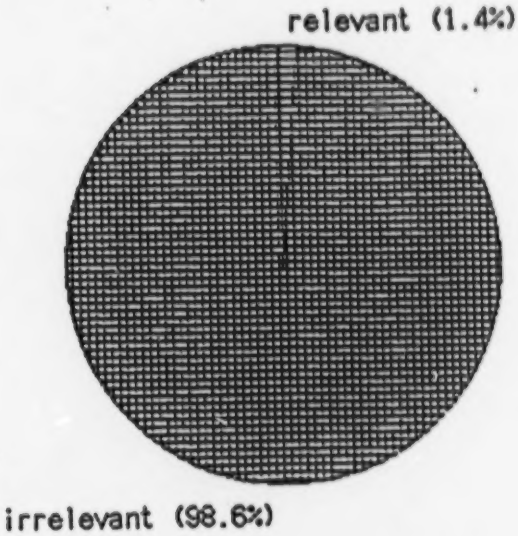

Fig.6-1 Relevance to context
Experts

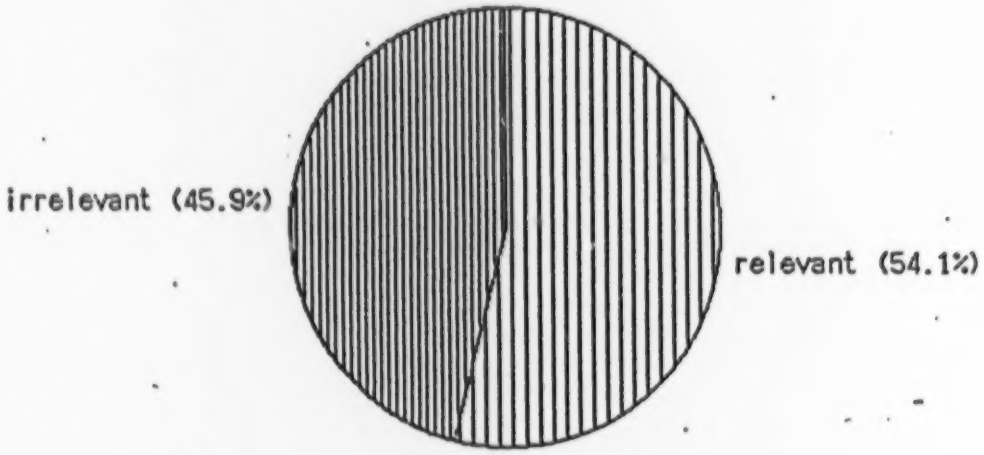


Fig.6-2 Relevance to context
Novices